

Development of a Single-Frequency Narrow Linewidth 1.5mm Semiconductor Laser Suitable for Spaceflight Operation, Phase II

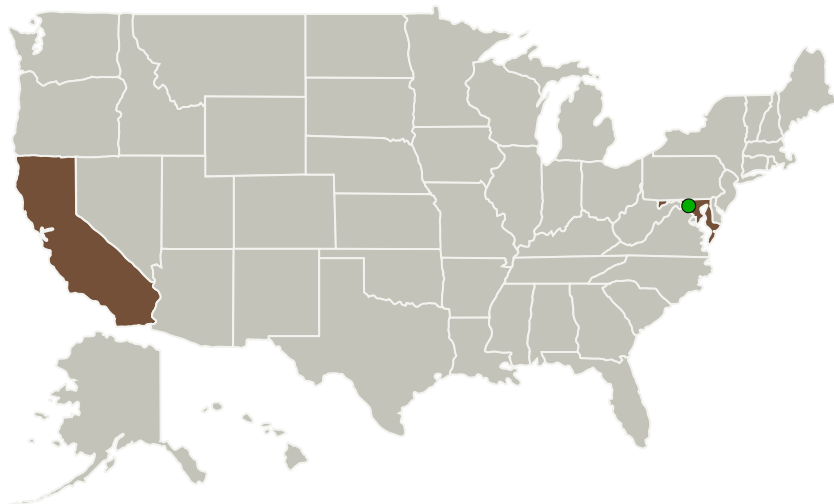
Completed Technology Project (2012 - 2016)



Project Introduction

In this Phase II proposal we plan to design and develop a semiconductor, low phase/frequency noise, single-frequency, external cavity semiconductor laser (ECL) emitting at 1064 nm for use in high-precision outer space measurement NASA missions. Many NASA space missions rely on the utilization of Light Detection and Ranging (LIDAR) techniques for atmospheric analysis and/or surface topography and distance measurement. A key and vital component of any LIDAR system is the laser source. Single frequency lasers are highly desirable for use in planned missions using LIDAR systems. The laser is based on the PLANEX laser technology developed by Redfern Integrated Optics Inc. (RIO). The PLANEX 1550 nm laser was originally designed and developed for terrestrial applications but it has been experimentally demonstrated to have a sufficiently low level of frequency and intensity noise to be suitable for precision measurement applications, such as those encountered in spaceborne LIDAR. For the Phase II effort, we propose to carry out a plan to design and develop a 1064 nm PLANEX laser for NASA LIDAR applications which will be based on the RIO PLANEX ECL originally designed for emission at 1550 nm, but need re-design for different semiconductor materials, fabrication processes and opto-electronic packaging for operation at 1064 nm wavelength in outer space.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Redfern Integrated Optics, Inc.	Lead Organization	Industry	Santa Clara, California
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

California	Maryland
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Project Transitions

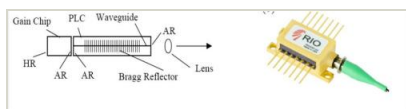
▶ **April 2012:** Project Start

✓ **July 2016:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137388>)

Images



Briefing Chart

Development of a Single-Frequency Narrow Linewidth 1.5mm Semiconductor Laser Suitable for Spaceflight Operation, Phase II
(<https://techport.nasa.gov/image/133275>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Redfern Integrated Optics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Lew Stolpner

Co-Investigator:

Lew Stolpner

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Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System